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Scientific and applied aspects of regulating of high-viscosity oil

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Abstract

Pipeline transportation of oil is considered to be one of the basic and cost-effective ways of their delivery to the place of consumption. Moreover, in the case of using electricity, the higher the viscosity of the transported oil is, the more power consumption is. For pipeline transport, it is characterized the movement of the oil in an isothermal mode, in which it changes its rheological properties, moving from a Newtonian fluid at high temperatures of the transported flow to a non- Newtonian one. In Russia, it has not been created a sufficiently rigorous theory of motion of highly viscous flows so far. The complex of the researches on the development of theoretical foundations, the technology of use of the Rotary-Pulsating Acoustic Apparatus (RPAA), creating a high-intensity acoustic field, indicate the possibility of their use in the processes of production, preparation, transportation and processing of high-viscosity oils1,2. The article contains important theoretical background of characteristics and problems of pipeline transport of highly paraffinic crude, the notions of "anomaly of viscosity of (structural) viscosity", "thixotropic liquids", "viscoelastic fluid". In the materials of the article there are the most currently known effective ways of transporting High-Viscosity Oils (HVO), among which it is considered how to use different physical fields as a method of influence on HVO. It has been considered the causes of the structural viscosity on the example of oil OGPE "Yelkhoneft" of PLC "Tatneft" at different temperatures and processed on the developed by the authors RPAA with different duration of exposure. Special attention is given to the dynamic tests for the subsequent measurements of the deformation process.

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Keywords

Acoustic impact, Dynamic viscosity, Flow curves, Heavy oils, Non-newtonian systems, Rheology, Thixotropy, Viscoelastic Fluid, Viscoelasticity, Viscosity